

SEP 18 2007

U.S. patent application no. 10/702,236

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A computer implemented method for screening a subject for disorders of glucose metabolism, comprising steps of:

noninvasively measuring a glucose concentration profile using a glucose concentration analyzer, said glucose concentration profile comprising a plurality of blood glucose concentrations from at least after a glucose or meal challenge;

generating with a pattern recognition system a screening factor, wherein said screening factor comprises a mathematical representation of at least a plurality of glucose concentrations within said glucose concentration profile, wherein said screening factor is uniquely associated with a state of glucose metabolism disorder, wherein said state of glucose metabolism disorder comprises a chronic condition, wherein said state of glucose metabolism disorder comprises a classification of any of:

a diabetic condition of diabetes mellitus, and

a pre-diabetic condition of diabetes mellitus; and

hyperinsulinemic; and

classifying the subject into one of said states of glucose metabolism disorder based on evaluation of said screening factor, wherein said screening factor comprises a ~~an abstract~~ representation of said glucose concentration profile; and

outputting said one of said states of glucose metabolism disorder to a display.

2. (Previously Presented) The method of Claim 1, wherein said plurality of blood glucose concentrations comprises a time series.

3. (Previously Presented) The method of Claim 1, wherein said blood glucose concentrations comprise actual values.

~~4. (Previously Presented)~~ The method of Claim 1, wherein said blood glucose concentrations comprise relative values.

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5. (Previously Presented) The method of Claim 1, wherein said screening factor is generated using a parameter, wherein said parameter includes any of:

maximum glucose concentration;

glucose concentration after elapse of a predetermined time interval;

area under the curve of the glucose profile; and

area under the curve of the glucose profile over a defined period of time.

6. (Previously Presented) The method of Claim 5, wherein said classifying step comprises:

comparing said screening factor with a corresponding predetermined value and/or a range of values indicative of either a normal condition or one of a plurality of abnormal conditions.

7. (Cancelled)

8. (Previously Presented) The method of Claim 1, wherein said generating step comprises:

determining a weight for each of a set of parameters.

9. (Previously Presented) The method of Claim 8, wherein said step of determining a weight comprises assigning each of said set of parameters a value on either a linear or non-linear scale.

10. (Original) The method of Claim 9, wherein minimum and maximum of said scale correspond to predetermined threshold values for a normal condition and a diabetic condition, respectively.

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11. (Original) The method of Claim 9, wherein minimum and maximum of said scale correspond to predetermined threshold values for a low glucose tolerance and a normal condition, respectively.

12. (Previously Presented) The method of Claim 9, wherein maximum of said scale corresponds to predetermined threshold values for a diabetic condition.

13. (Original) The method of Claim 9, wherein ranges of values represented by said scale are established according to standard diagnostic criteria.

14. (Original) The method of Claim 9, wherein missing parameters are assigned a weight of zero.

15. (Currently Amended) A computer implemented method for screening a subject for disorders of glucose metabolism, comprising steps of:

noninvasively measuring a glucose concentration profile using a glucose concentration analyzer, said glucose concentration profile comprising a plurality of blood glucose concentrations from at least after a glucose or meal challenge;

generating a screening factor, wherein said screening factor comprises a mathematical representation of at least a plurality of glucose concentrations within said glucose concentration profile, wherein said screening factor is uniquely associated with a state of glucose metabolism disorder, wherein said state of glucose metabolism disorder comprises a chronic condition, wherein said state of glucose metabolism disorder comprises a classification of any of:

a diabetic condition of diabetes mellitus, and

a pre-diabetic condition of diabetes mellitus; and

hyperinsulinemic; and

classifying the subject into one of said states of glucose metabolism disorder based on evaluation of said screening factor; and

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outputting said one of said states of glucose metabolism disorder to a display,

wherein said generating step comprises determining a weight for each of a set of parameters,

wherein said step of determining a weight comprises assigning each of said set of parameters a value on either a linear or non-linear scale, and

wherein missing data are supplied from historical data.

16. (Previously Presented) The method of Claim 1, wherein said step of generating a screening factor uses actual or relative values for parameters and weights.

17. (Currently Amended) A computer implemented method for screening a subject for disorders of glucose metabolism, comprising steps of:

measuring a glucose concentration profile using a glucose concentration analyzer, said glucose concentration profile comprising a plurality of blood glucose concentrations from at least after a glucose or meal challenge;

generating a screening factor, wherein said screening factor comprises a mathematical representation of at least a plurality of glucose concentrations within said glucose concentration profile, wherein said screening factor is uniquely associated with a state of glucose metabolism disorder, wherein said state of glucose metabolism disorder comprises any of:

diabetic;

pre-diabetic; and

hyperinsulinemic; and

classifying the subject into one of said states of glucose metabolism disorder based on evaluation of said screening factor; and

outputting said one of said states of glucose metabolism disorder to a display,

wherein said step of generating a screening factor comprises the step of calculating a weighted average of weighted parameters according to:

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$$SF = \frac{(P_1W_1 + P_2W_2 + P_3W_3 + P_4W_4 + P_5W_5 + P_6W_6)}{(W_1 + W_2 + W_3 + W_4 + W_5 + W_6)}$$

wherein  $SF$  is said screening factor,  $P_1$  is a first parameter, said first parameter comprising glucose concentration,  $P_2$  is a second parameter, said second parameter comprising rate at which glucose concentration rises,  $P_3$  is a third parameter, said third parameter comprising maximum monitored glucose concentration;  $P_4$  is a fourth parameter, said fourth parameter comprising duration that glucose remains elevated;  $P_5$  is a fifth parameter, said fifth parameter comprising rate of decrease of glucose concentration after a peak; and  $P_6$  is a sixth parameter, said sixth parameter comprising minimum glucose concentration after a maximum; and wherein  $W_1$ ,  $W_2$ ,  $W_3$ ,  $W_4$ ,  $W_5$ ,  $W_6$ , are weighting factors, wherein at least two of said weighting factors are non-zero.

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Previously Presented) The method of Claim 16, further comprising a step of establishing threshold screening limits based on said screening factor.

22. (Previously Presented) The method of Claim 1, wherein said mathematical representation is generated using any of:

an initial fasting glucose concentration;

a rate of increase of glucose concentration following said glucose challenge;

a peak monitored glucose concentration;

a duration glucose remains elevated;

a rate of decrease of glucose concentration following said peak concentration;

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a minimum glucose concentration following said peak concentration;  
an area under the curve for the glucose profile; and  
an area under the curve during a subset in time of the glucose profile.

23. (Previously Presented) The method of Claim 1, further comprising the step of advising the subject of screening results.

24. (Previously Presented) The method of Claim 1, further comprising the step of advising the subject of health risks from complications likely to result from subject's condition.

25. (Previously Presented) The method of Claim 1, wherein said glucose concentration analyzer comprises any of:

a minimally invasive blood glucose analyzer; and  
an invasive blood glucose analyzer.

26. (Original) The method of Claim 1, wherein a processing device so programmed executes said steps.

27. (Cancelled)

28. (Currently Amended) The method of Claim 1, wherein said glucose concentration ~~concentrations~~ analyzer comprises a noninvasive blood glucose analyzer.

29. (Previously Presented) The method of Claim 1, wherein said screening factor comprises a numerical value.

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30. (Previously Presented) The method of Claim 1, wherein said screening factor comprises representation of a shape of said glucose concentration profile.

31. (Cancelled)

32. (Currently Amended) The method of Claim 1, wherein said screening factor comprises

the result of an unsupervised classification, wherein said unsupervised classification uses an exemplary set of features to explore and develop clusters of data in feature space, wherein said data comprises said glucose concentration profile.

33. (Currently Amended) A computer implemented method for screening a subject for disorders of glucose metabolism, comprising steps of:

measuring a glucose concentration profile using a glucose concentration analyzer, said glucose concentration profile comprising a plurality of blood glucose concentrations from at least after a glucose or meal challenge;

generating a screening factor, wherein said screening factor comprises a mathematical representation of at least a plurality of glucose concentrations within said glucose concentration profile, wherein said screening factor is uniquely associated with a state of glucose metabolism disorder, wherein said state of glucose metabolism disorder comprises a chronic condition, wherein said state of glucose metabolism disorder comprises a classification of any of:

a diabetic condition of diabetes mellitus, and

a pre-diabetic condition of diabetes mellitus; and

hyperinsulinemic; and

classifying the subject into one of said states of glucose metabolism disorder based on evaluation of said screening factor; and

outputting said one of said states of glucose metabolism disorder to a display,

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wherein said screening factor comprises the result of a supervised classification,  
wherein said supervised classification defines a class of said screening factor through  
known differences in data, wherein data comprises said glucose concentration profile.